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Northeastern

NORTHEASTERN FOREST EXPERIMENT STATION

Division of Watershed Management Research

Semi-annual Report April 1961

GENERAL

The well-burnished Northeastern image of alert, imaginative, hard-working watershed researchers could be dimmed by this somewhat dull, uninspired, lethargic report. But, we have the image, and in these days the image counts most: please pass the polish.

The Division Chief started a number of projects and completed none. He and Pete Fletcher (veteran watershed researcher now Dean, School of Forestry, Penn State) worked over some Vicksburg project soil-moisture data collected at the University of Missouri (confused?); a rough draft work plan was written for analysis of some of the northeastern Geological Survey streamflow records; with Irv Reigner we stirred up some interest in cooperative research with the Bethlehem (Pa.) Water Authority, and the Wissahickon Valley Water Association (suburban Phila.); we laid summer plans to add 3 experimental watersheds to the State College, Pa. network--giving 6 in all; and we planned a June program review at the Fernow.

ELKINS RESEARCH CENTER

Aside from routine measurements and computations, most work in this period has gone into data analysis and preparation of manuscripts.

A draft of the proposed Station Paper on "Effect on Streamflow of Four Different Cutting Practices in the Appalachian Mountains of West Virginia" is being submitted to Upper Darby. A paper based upon the same material is being prepared for the Journal of Geophysical Research and will be presented to the annual meeting of the American Geophysical Union in Washington on April 18. Art Eschner is working with Jack Larmoyeux, a fish biologist, on the effects of forest cutting on water quality and its implications in trout management.

A 3-day watershed management research meeting is being planned in June to review the Fernow and regional programs and consider direction of research in the future.

In the 1960 growing season, significant streamflow increases were again measured on the Clearcut and Diameter-limit Watersheds but, as might be expected, they were considerably less than in the preceding year.

LACONIA RESEARCH CENTER

For the last six months we have been engaged in Operation CULE (Clean up loose ends). This could also be spelled CULL. Some of the chores involved completing and revising manuscripts, writing working plans, re-evaluating our streamflow and climatic records and compilations, drawing plans for a revised stream-gaging station, plus other odds and ends.

Winter Soil Temperature

In an exploratory study of the influence of snow cover on soil temperature, stacks of thermocouples were placed at varying depths in the soil in a pole-sized hardwood stand. Litter was removed from both plots. Snow was allowed to accumulate normally on one plot, while an adjacent plot was kept bare of snow by shoveling or sweeping after each snowfall.

Before the first snow, temperatures at corresponding soil depths for the two plots were the same. Minimum temperatures of -1° F. four days prior to snowfall froze the surface 3 inches of soil in both plots. With the onset of snow and colder air temperatures, soil temperatures in the bare plot began falling while those in snow-covered plot remained about the same as before snowfall.

During a 2-week period of cold weather with air temperatures fluctuating between -10° F. and +10° F. soil temperature under 18 inches of snow held steady at 32° F. at the soil surface and 38° F. at the 24 inch depth. Soil temperatures on the bare plot were about 12° F. at the surface and 30° F. at the 24 inch depth.

Maximum snow depths of about 24 inches (7-inch snow-water content) prevented soil freezing below 3 inches and in some instances prohibited soil freezing entirely.

Soil Surveying

A start was made last fall on a detailed soil survey of 32-acre gaged watershed. We originally thought such a survey could be completed in 2 to 3 days. With our steep topography, complexity of intermingled soil types in glaciated mountain terrain, and presence of pan layers, we had to alter our sights for the time required for the job. One factor readily became apparent. If our survey was to be meaningful, it must include the depth to and delineation of the pan soils and some indication of the depth to bedrock. We tried digging and augering down to the pan and bedrock, but in most cases we were unsuccessful. This spring we hope to be able to use a combination of long auger and either seismic or resistivity methods for determining depth to pan-layers and bedrock. We would be interested to know if anyone has used

geophysical techniques for locating compacted soil layers and bedrock with 20 to 30 feet of the surface.

Weasel Parts

For those interested in securing scarce weasel parts, we suggest you contact Consolidated Industries, Weasel Sales and Service, Dover, Delaware (we have no stock in the company). This concern completely replaced the running gear on our weasel--all new bogies, sprockets, and track (reinforced with two 3 inch wide x 1/2 inch thick bands of rubber and nylon). Since the overhaul job, our faith in our weasel for over-snow travel has soared to the point where we are convinced the weasel is just the right vehicle for our use and terrain.

NEW LISBON RESEARCH CENTER

A review of our watershed activities over the past 6 months led to the discouraging conclusion that it was almost a lost half-year. There were a few accomplishments, but they were sandwiched between meetings, fence-mending trips to cooperators, a five-week statistical course, and two short periods at the Dilldown Watershed where we donned our Forest Management Research hat.

One small activity has been a study on inhibiting evaporation from standard raingages. Our cooperators at the Newark and Baltimore watersheds visit their gages only once per week, and of course there is evaporation from a rainfall early in the week. The standard procedure in this case is to charge the raingage with a layer of oil which will prevent evaporation, a rather messy procedure at best. In a search for something better we have tried Lorol 24, a hexadecanol. Although this substance has been found to be effective in retarding evaporation from reservoirs, it had practically no effect in a raingage. Perhaps it was the wrong hexadecanol, or perhaps it had lost its effectiveness through deterioration, as it was not fresh material. Within the past few days we have obtained a small supply of Lorol 7, a dodecanol-tetradecanol substance that has tested well as a reservoir evaporation retardant. This turned out to be a liquid that solidifies at about 68° F. We understand that it can be kept liquid with the addition of ethanol.

More investigation will be carried on with these chemicals, but we have a feeling that oil may be the best answer to our problem after all. Any suggestions will be greatly appreciated.

Single-Watershed Calibration

During the course of writing our Station Paper on this subject, we became suspicious of the effect of soil moisture storage change on annual flow. We knew that our soil moisture data were not accurate on

a watershed basis, but originally presumed that it would be better than no data.

The measured storage change variable we had used previously was the sum of groundwater and soil moisture storage changes (in those months without snow). Instead of this variable, we substituted merely the groundwater storage change. Sure enough, this variable, in conjunction with the precipitation and temperature variables, resulted in better estimates of runoff than did the composite variable. The conclusion is that our soil moisture figures are so inexact on a watershed basis that they cannot be used.

The above has no bearing on estimated total storage change which is estimated from antecedent precipitation and temperature. And the estimated storage change variable is considerably more efficient in the multiple regression than is the measured storage change.

Water Color

We have for loan a copy of a 50-page report on the effects of vegetation on water color, prepared by an engineering firm for Bethlehem, Pa. in 1948. It's an interesting subject, one we hope to get into. This report gives some literature references and results of tests.

PUBLICATIONS

Prospects in the Northeast for affecting the quantity and timing of water yield through snowpack management. Howard W. Lull and Robert S. Pierce. Proc. of Western Snow Conf., 1960: 54-62.

Effect of scrub oak and associated ground cover on soil moisture. Arthur R. Eschner. Northeast. Forest Expt. Sta. Paper 133, 16 pp., 1960.

Snow accumulation and melt under certain forest conditions in the Adirondacks. Howard W. Lull and Francis M. Rushmore. Northeast. Forest Expt. Sta. Paper 138, 16 pp., 1960.

Automatic devices to take water samples and to raise trash screens at weirs. K. G. Reinhart, R. E. Leonard, and G. E. Hart. Northeast. Forest Expt. Sta. Note 112, 7 pp., 1961.

Humus depths under cut and uncut northern hardwood forests. George Hart. Northeast. Forest Expt. Sta. Note 113, 4 pp., 1961.

Manuscripts Submitted

Further observations of snow and frost in the Adirondacks. Howard W. Lull and Francis M. Rushmore.

Influence of forest cover on snow and frost in the Adirondacks. Howard W. Lull and Francis M. Rushmore.

Water management--One of the multiple uses of forest land. G. R. Trimble, Jr.

Interception of precipitation by northern hardwoods. Raymond E. Leonard.

Effect on streamflow of four different cutting practices in the Appalachian mountains of West Virginia. K. G. Reinhart, A. R. Eschner, and G. R. Trimble, Jr.